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ERRATA.

Page 93, 17th line from bottom, for "genuine" read "generic."
" 135, 15th " " " " "S. argophylla" read "H. argophylla."
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" 303, title " "Gulo lucens" read "Gulo luscus."

INTRODUCTION.

The want of a medium for recording in accessible form the numerous, often unconnected observations, pertaining more particularly to the western part of North America, made by amateurs as well as by working naturalists, has been felt as a serious drawback. Such a means is now offered in this journal, which, while supplying an existing need, will, it is hoped, greatly extend and stimulate the taste for these observations among those who are little attracted by the graver and more technical works published by scientific societies.

Contributions of such studies in the life-history and structure of animals and plants are preferred to all other communications, though a moderate amount of systematic work will be welcomed. The bulky compilations which delight the soul of the encyclopedian scientist will not appear in the pages of ZOE, and pains will be taken, as much as possible, to disembarrass the grain of truth from its attendant mass of chaff.

It is hoped that the support accorded to this journal will be sufficiently liberal to admit of copious illustration, and every effort will be made to render it worthy of such encouragement.

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THE NOMENCLATURE OF ORGANIC LIFE.

BY H. W. HARKNESS.

To facilitate the study of the natural sciences and avoid confusion, it is important that no two species shall have an identical name.

No department of science, so far as I am aware, has laid down the rule that such names are not admissible, though all discourage them. They exist at present in large numbers, and in departments which have an unusually intimate connection with the vegetable world, as in the case of entomology, are productive of considerable inconvenience, requiring at the least the suffix Bot. or Ent. to the name.

They exist, also, though only in inconsiderable number in botany, as between phanerogamic and cryptogamic—especially fungi—but with the impending reductions of genera will probably nearly or entirely cease.

Their consideration, which should be preceded by conscientious revisions, may seriously affect the nomenclature of all branches of biological science, as the tendency undoubtedly is to make the law of priority absolute throughout the organic world.

In a more restricted sense, the question, though necessarily of equal interest to all, is now raging with especial virulence in the department of phanerogamic botany, and has developed in some quarters a regrettable amount of bitterness.

The rigid enforcement of the law of priority seems to give the best promise of a stable nomenclature—a boon so precious that even a very considerable preliminary confusion may well be endured in the prospect of attaining it. To be in any degree effectual, it should be enforced without any of those exceptions upon which systematists soonest and most completely split.

The beginning of classification is, undoubtedly, that assemblage of forms having a common and not too distant origin, and ultimately reproducing itself, subject to variation by environment, which we are accustomed to consider an entity and call "species," and if priority is to have any force or meaning it must commence here with the name proper of the organism. The practice which has had, and still has, some notable followers, of changing specific names at will, whenever it was thought necessary to alter their grouping, tends to obscure their identity and render it doubly difficult to trace them through the changes of genera, without offering any compensating benefit. The only valid reason which can be given for changing a specific name is the existence in the same genus of an identical older one, and even then the change should not be made without a most critical examination of the affected species, for it may easily happen that after a whole series of duplicate specific names have been changed in consequence of the merging of two or more genera, many of the so-called species may be proved to be mere forms, and not entitled to names, and unnecessary confusion will have resulted from the hasty action of some individual inspired with no higher motive than attaching his name to species.

Genera form a secondary step—they presuppose the existence of species; and it naturally follows from this view that in cases where at first, as with many Linnæan names, only one word was applied to a species, it should have remained the specific name, and not have been altered in rank, although the practice of Linnæus seems usually to have been the reverse.

It has happened, curiously enough, that priority in generic names has been much more respected than in specific ones, perhaps as a sort of compensation for their mutations in boundaries, yet they do not escape; and one of the most flagrant violations of the rule—entirely, however, without those elements of vanity and meanness which so frequently figure in these changes—has been often mentioned in my hearing. It was the act of the eminent botanist Bentham, and was, in effect, a claim that both generic and specific names might be changed for very trivial reasons—for no principle has been better established than that which rules that an author shall have no more power over a name once published than any other person. He published a genus of Californian plants founded on a single species which he named *Adenostegia rigida;* but subse-

quently finding that there were other species without glands, and his generic name would be somewhat inaccurate, he retired not only the generic, but the specific name as well, in favor of a later manuscript one of Nuttall's—so that the name of the plant as it appears to-day in our books is *Cordylanthus filifolius* Nutt.

Dr. Asa Gray is known to have held opinions similar, at least measurably, to Mr. Bentham's, but his fine tact early led him to see that such license, if justified in opinion, had better be exceedingly restricted in practice. Indeed, his argument that a name is but a name and no part of the description of an organism, has been much used by advocates of a rigid priority, for if the name, even if descriptive, is to be considered no part of the description, it matters nothing at all if it be meaningless or even false—perhaps even the incongruity may be an aid to memory, as in a case mentioned by an entomologist friend, *Sesia Schmidttiformis*, where the ludicrous idea presented to the mind stamps the name of the species firmly upon it. In the life of humanity this kind of false naming gives no sort of trouble. We have all known "Blacks" who were remarkably white, and "Whites" who were at least dingy, yet none of them seem to suffer inconvenience, or apply to the courts for relief.

The objections of purists against barbarous compounds, names from the vernacular, etc., etc., may be very easily waived. The "classical" terminology of any of the sciences would probably appear very barbarous to Cicero, and the most vigorous sticklers in this regard are usually those who, having acquired late "a little Latin and less Greek," wish to make of that little as great a display as possible.

It has been gravely argued that priority being a question of time, does not apply, for instance, to names on the same page, which being printed at one stroke of the press, are therefore simultaneous. The absurdity of this argument may readily be seen from the fact that not only the page, but a certain number preceding or following it, varying from three in folio to 23 in 24mo., are so printed.

The "Citation of Authors" brings up a whole field of vexed questions, none of them of very great importance, except to the feelings of the said authors. In the case of well-known species these citations are dropped, in popular and semi-popular publications, and as names become settled they will probably at length lose their sometimes unwieldy appendices in the more scientific. They probably served

a more useful purpose in the infancy of science, when the name of the author appended to a genus or species was often, at the same time, a reference to a solitary book or series, than in these days of numerous journals, proceedings of societies, etc., where frequently the name gives no sort of clue to the place of publication.

As a method of escape from the conflicting claims of the first to the fiftieth author who has dealt with any given species, the citation in place of the author, of the place of publication or the page of an index, to which sooner or later all such matters are likely to be relegated seems to offer many advantages. One not inconsiderable benefit would be the removal of the temptation to found genera and species in whose creation nature had no part, so that the author might, by attaching his name thereto, acquire a brief glory and a fleeting aggrandizement. It has been often said that the attaching of these citations was merely a matter of sentiment; but if they serve no other purpose, the sentiment, in the case of a species at least, is certainly misplaced, and belongs rather to the one who in long and toilsome, often hazardous, sometimes fatal journeys, first finds it in its native haunt, rather than to the systematist who, sitting at ease by his fireside, leisurely dissects and labels it.

The nomenclature of certain departments, notably fungi, on account of the polymorphism of a large proportion of the species, is complicated by unusual questions, the consideration of which is deferred to a future notice.

AN ARBORESCENT POLYGALA.

BY T. S. BRANDEGEE.

Polygalas are described as herbaceous and shrubby plants, but I know of no instance of one ever having been mentioned growing so large as to become a tree. *Polygala apopetala* was described from small specimens growing at its most northern habitat. This year I found it abundant in the Sierra de Laguna, a range of mountains near Todos Santos, in Lower California, that reach an altitude of nearly 5,000 feet. In the cañons at the base of the range this handsome species acquires its greatest development, and becomes a small tree, having a trunk and spreading top, and equaling in height the surrounding Acacias and Lysilomas. The finest example seen

was fifteen feet high or more, with the ends of the branches terminated by racemes of showy flowers in full bloom.

The plate of this plant in the Proceedings of the California Academy, drawn from specimens collected at Comondu, does not represent in the least its beauty as seen in the Sierra de Laguna, where a single raceme, crowded with purple flowers, equals the length of the drawing. It is found growing as a bush about the high altitudes of the mountains, and during my visit withstood slight frosts, proving that it is somewhat hardy, and would grow in a more northern climate, and perhaps be capable of becoming an ornament to the gardens of San Francisco.

THE NESTS AND EGGS OF TOWNSEND'S JUNCO (*Junco townsendi*) AND SAN PEDRO PARTRIDGE (*Oreortyx pictus confinis*).

BY A. W. ANTHONY.

In the latter part of April and first of May, 1889, this junco was found by Mr. Chas. H. Townsend and the writer to be very abundant throughout all of the San Pedro Martir region, above 7,000 feet elevation, and many nests could doubtless have been taken had the time at our disposal permitted of our making a more extensive search. But three sets were taken, and these vary to such an extent that a description and comparison is of interest.

Set No. 178, coll. A. W. Anthony, from San Pedro Martir, Lower California, taken May 6, 1889, at an elevation of 9,000 feet. Nest composed of soft, dry grasses and lined with finer grass stems and hair of the mule deer. In form it is rather bulky, the walls being unusually thick, but soft. It was very artfully concealed behind a thick bunch of grass and under the overhanging edge of a large granite boulder. The eggs were three in number and slightly incubated. The shell is pure white in two specimens, while the third shows a slight greenish wash. This specimen is also the most strongly marked of the set, being heavily blotched with pale lilac, chiefly on the larger end, but extending in small flecks over nearly the entire shell. The other two are marked with small spots of pale fawn color, with a few small spots and lines of burnt umber collected about the large end. They measure in millimetres 19 x 15;

19 x 15; 19 x 14. The nest measures externally 130 mm. in width, by 60 mm. in height; inside diameter, 57 mm. by 30 mm. in depth.

Set No. 177 was taken in the same locality May 5. The nest was sunken to the level of the ground, apparently in a cow-track, and well hidden in the tall grass on the edge of a running stream. Owing to its location the walls are very thin and the nest much smaller than the first mentioned; measuring inside 70 mm. in width by 40 mm. in depth. The material used in its construction is the same as that in set No. 178, with the addition in the lining of a little cow hair. The eggs of this set are alike in color and markings, and appear at first glance more like eggs of *Sialia mexicana* than those of any junco with which I am familiar. They are uniformly bluish-white with a few of the faintest minute specks of burnt umber, on the large end, which are not at first noticeable. Incubation was well advanced. Measurements, 20 x 15; 19 x 15; 20 x 15 mm.

Set No. 179, May 1, presents features different from either of the others in their profuse markings, they being, I think, the heaviest I have seen in this genus. The ground color is faint bluish-white; one is heavily marked with large spots of raw umber and lilac, chiefly collected about the larger end, but covering the entire shell to a great extent; another has a heavy ring of raw umber encircling the large end, mixing with finer spots of lilac, a few fine markings straying over the entire egg. The third has similar markings, but collected about the small end, though it is hardly proper to call either end small in this case, the specimen being unique in having ends almost equal in diameter.

Unfortunately the nest was not saved with the set. The eggs measure 20 x 15; 19 x 15; 18 x 15 mm.

The single nest of the San Pedro partridge that I have seen was discovered near the base of the San Pedro Martir range, March 29, 1889. It contained but a single egg, while the female, which was secured as she left the nest, furnished a second, which she was about to deposit. These specimens are of the usual pyriform shape common to the genus, and not distinguishable from eggs of *O. pictus* in my collection from Oregon.

In color, creamy white; measuring in millimetres, 37 x 27; 36 x 28.

The nest was a mere hollow under a manzanita bush, filled with dry leaves from the manzanita and lilac.

NOTES ON THE NATURALIZED PLANTS OF SOUTHERN CALIFORNIA. I.

BY S. B. PARISH.

The evidence upon which plants are excluded from the native flora of regions in which they are found growing spontaneously, must in many cases be largely inferential. Some species there are of such world-wide notoriety that they may be branded as "cosmopolitan weeds," even when detected in the least suspicious places. As to others, direct testimony may sometimes be produced as to when, where and how they first obtained a foothold. But the records are too scanty, and the intrusion is usually too insidious for this to be often the case. The negative evidence of the absence of a species from every collection of plants is not conclusive, especially of common weeds. In exploring a new field the well-known plants are the ones a collector is most likely to leave ungathered. Few are so thorough as to include in their sets purslane and pigweed, when most of the vegetation by which they are surrounded is still rare or new. It is the later gleaner who takes everything, and many of his additions are of plants his predecessors thought too common to gather.

Often circumstantial evidence must be relied upon. The habitats of the suspected plant are to be examined, its history traced as far as possible, and the probabilities of its accidental origin and dispersion considered. California is not a new country, if we date back to its Spanish settlement, but the agencies by which plants are disseminated were few and sluggish in the days of the Missions, while in recent years their activity and multiplicity have been wonderfully increased. Railroads facilitate the transportation of produce of every kind from all parts of the country, and are likely to bring us most of the weeds and some of the indigenes of the regions through which their ramifications extend. The coming and spread of them should be recorded, and in their investigation the local observer may occupy himself with profit.

The following notes are mostly confined to the four southermost counties of the State—San Diego, Orange, Los Angeles and San Bernardino—and relate more especially to the last named, in which my opportunity for observations has been most extended.

Among the most widely dispersed of our naturalized plants the

two species of Erodium, indiscriminately known as "Alfileria," easily hold the first place. There is, however, a considerable difference in respect to the extent to which they have established themselves. Every western collector, from the Mexican to the Dominion line, finds *E. cicutarium* in abundance. Indeed, Brewer and Watson* incline to regard it as a native, and in his Bibliographical Index Dr. Watson prints it in ordinary type as an indigenous species. Dr. Trelease,† the latest monographer of the order, has no hesitation in pronouncing it an introduction. And it is easy to accept this view when it is considered how admirably the seed is adapted for conveyance in the fleece of sheep. Indeed, it rather would have been strange had it not been brought over by the Spanish flocks, or carried wherever their successors have wandered.

But *E. moschatum*, which has a seed essentially the same, has not established itself as widely as its companion. Few references to it are found in botanical reports. It does not appear to have been found by the botanists of the Mexican boundary, but first appears in the collection of the Pacific Railroad Survey.‡ The Botany of California returns it only from Los Angeles and Santa Inez Valley. Dr. Palmer got it below our boundary on Guadalupe Island§ and on the adjacent mainland, at San Quintin Bay.‖ Prof. Greene has also collected it at the former station,¶ and on San Miguel Island†† in the Santa Barbara channel. Professor Brewer does not even enumerate it in his exhaustive account of the Foreign Plants of the United States for the tenth census.‡‡ These reports indicate that it is mostly confined to the southeen extremity of the State. Dr. Trelease indeed calls it a mere "roadside weed." On the red-clay foothills of the San Bernardino Valley it, however, grows in great abundance, and so luxuriant as sometimes to be cut for hay. On these hills it is much commoner than its congener. On black adobe soil it is much less abundant, and on sandy ones very scarce. *E. cicutarium* nearly reverses this distribution, but its preferences of soil are less pronounced, and this may have aided in its wider dif-

*Bot. Cal. I, 94.
†N. A. Geran., 81.
‡Torrey, Pac. R. R. Rep. VII., 8.
§Wats. Proc. Am. Acad. XI, 114.
‖Vasey & Rose, Proc. Nat. Mus., 1888, 534.
¶Bull. Cal. Acad. I., 222.
††Pitt. I, 85.
‡‡To complete the account it may be added that it has been detected twice in Canadian gardens. Macoun, Cat. Canad. Pl. 1, 91.

fusion since it appears to be able to thrive under a greater variety of conditions. It is worth noting that it is to the plant-eradicating sheep, which has wrought such destruction to our native flora, that California probably owes the introduction of its most valuable and abundant forage plants, namely, alfileria, bur-clover and wild oats, and that all are of Mediterranean origin.

Silene Gallica is another foothill plant, although not restricted to a particular soil. It is a companion of *S. antirrhina* and has as much appearance of being indigenous as that species. Both are far from rare, and are thoroughly at home on rough hillsides and the steep banks of cañons quite removed from cultivation, and I have never observed it in fields or by waysides, where one expects to find intruders. The former species, however, is put down in the books as an exotic. But one who observed its habits here would certainly never suspect that it was not indigenous, and I am disposed to exclude it from the catalogue of our introduced plants.

A third habitant of the foothills is the "Lady's Mantle" of Europe, *Alchemilla arvensis*. This delicate little herb is very abundant in early spring on clayey slopes, usually seeking the partial shelter of open growths of Adenostoma and other shrubs. Although an introduced species in the Atlantic States, it is here evidently indigenous.

I am also disposed to claim a native origin for *Apium graveolens*, although it is always noted as the opposite. Brewer and Watson state of this "Wild Celery" that it is "rare in California, but has been collected in salt marshes from Santa Barbara to San Diego, and also at Fort Tejon."* Coulter and Rose† add another station, San Bernardino. It is, in fact, common enough throughout this region, abounding on wet meadows and by stream banks. It has no more appearance of a foreign origin than has *Œnanthe sarmentosa*, with which it is frequently associated. So widely diffused and well established a plant, if introduced at all, must have gotten its start in Spanish times. Now the cultivation of celery as a vegetable indicates a far more advanced state of the gardener's art than existed at the ranchos and missions of that period. The seed also is one that very soon loses its vitality, which diminishes the chances of the vegetating of an accidental sowing. Considering then the

*Bot. Cal. I, 258. †Rev. Umbell, 124.

thoroughly established and stationary habit of the plant, for it is certainly not increasing, at least in later years, and the unlikelihood of any extraneous origin, it appears more satisfactory to regard it as a native of this region, as well as of the coasts of Southern Europe.

Here may be mentioned a few other Umbelliferæ which had not been observed when the Botany of California was completed.

Pastinaca sativa, the wild form of the cultivated parsnip, I first collected in 1882 in Edgar cañon, near the San Gorgonio Pass, where it was well established at a stream bank for some distance below a farm house. About five years ago it began to appear by the roadside near San Bernardino, and is yearly becoming more abundant.

Anethum graveolens occasionally appears in the same neighborhood, but so far as I have observed only as a transient escape by roadsides and yards. Dr. H. E. Hasse, however, reports it as "apparently established at Los Angeles."

The same gentleman has observed *Fœniculum vulgare* as an escape at the same place, and Mr. W. E. Lyon has collected *Coriandrum sativum*, the common coriander, in San Diego county.*

*Coult. & Rose, Rev. Umbell., 35.

** The writer would be greatly obliged by the communication of notes on the naturalized plants of the region embraced in this paper, in order that the account may be as complete as possible.

THE EVOLUTION OF THE CATFISHES.

BY CARL H. EIGENMANN.

The Nematognathi, the Eventognathi and the Gymnonoti have been united by some comparative anatomists, chiefly on account of the presence of a Weberian apparatus, under the supra-ordinal name Ostariophysiæ. The Weberian apparatus consists of a chain of ossicula auditus lying beneath the lateral processes of the anterior coössified vertebræ. The structure and functions of this apparatus being highly complicated and specialized it is not probable that it was independently developed in the above named orders, and the common descent of the Nematognathi, Eventognathi and Gymnonoti from primitive Ostarioyhysiæ may be granted. This view was first proposed

by Sagemehl. Cope and Gill in their systems have derived the Nematognathi and Eventognathi from distinct sources.

The Nematognathi are distinguished from the remaining Ostariophysiæ by the absence of a suboperculum and the coössified supra-occipital and parietals, and, with one exception, by the vestigiary maxillary. In general appearance some members of the order approach the Eventognathi so closely that even Valenciennes was misled by the superficial resemblance. In this paper only American forms are considered, but the series of Nematognathi from the lowest (Diplomystes) to the highest (Farlowella) living species is so complete among American species that I am led to believe that all exotic forms are descendants of emigrants from the Americas. Not many fossils of this order have been found, and those which have been discovered do not help us materially in determining the inter-relations of the higher groups.

The date of the differentiation of the orders of Ostariophysiæ is uncertain. Silurinæ,* Bagariinæ and Pimelodinæ† were separated as early as the beginning of the Tertiary, and as both these subfamilies are quite remote from the most primitive living nematognathoid the Nematognathi must extend into the secondary period.

The Nematognathi reach their highest development in the neotropics, where they constitute forty per cent. of the entire fresh-water fish fauna. All the families,‡ subfamilies and genera now inhabiting this region have undoubtedly originated here. In most of the families the maxillary bone is a mere vestige and serves only as a support for a highly specialized dermal appendage, the maxillary barbel. So greatly has this bone been modified even in its development that Ryder§ seriously questioned whether the basal bone of the maxillary barbel in the North American cat fishes is in reality the vestige of a maxillary. No doubt need, however, be entertained on that score, since in Diplomystes the basal bone of the short primitive maxillary barbel is a functional dentiferous maxillary.

The comparative development of the maxillary is, then, an excel-

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**Pseudeutropius* and *Bagarius*, living Indian genera, have been found in tertiary deposits of the highlands of Padang in Sumatra.

†Leidy, Contr. Ext. Vert. Fauna Western Ter., 192. The species recorded by him is in all probability a member of Cope's Rhineastes. Cope, Ter. Verteb.

‡ The families of this order were defined by us in the Am. Nat., July, 1888.

§On the Development of Osseous Fishes, Washington, 1886.

lent guide to the determination of the rank any family is to occupy in the system.

Other structures valuable in this respect are the different barbels so highly developed in some forms. Of the development of the barbels of *Ictalurus albidus*, Ryder says:

"The remarkably developed barbels of the embryos of the species make their appearance very early, especially the maxillary pair; these appear on the second day. * * The barbels on the lower jaw do not appear till the fourth day of development is completed. * * The last of all to be developed is the nasal pair * * [which] does not appear until the seventh day."

In Diplomystes only short maxillary barbels are developed, and, as stated above, the maxillary is dentiferous and forms the mouth border above. It therefore has its barbels less specialized than the remaining families, while its maxillary is more generalized and resembles most that of other fishes. The Diplomystidæ may therefore be considered the most primitive of the Nematognathi. At present this family is resricted to the fresh waters of central Chile.

The next important factor to be considered is the relative development and specialization of the air bladder and Weberian apparatus. In the Bunocephalidæ and the Siluridæ, with the exception of the Ageneiosinæ, the air bladder is large and lies below the coössified vertebræ. In the remaining families the air bladder has been split into lateral halves, and, with the corresponding bones of the Weberian apparatus, has been enclosed in a bony capsule.

In the Bunocephalidæ there are no indications of any approach to the enclosed air bladder, and indeed this family shows little resemblance to the remaining families. It has lost the opercular bones entirely, and has in other ways attained a high state of specialization. It was early differentiated from the descendants of the Diplomystidæ, but not before the maxillary had become quite vestigiary. Two subfamilies have become differentiated; they differ chiefly in the number of vertebræ in the tail and the number of anal rays. This family inhabits the Amazon and the South American rivers to the north of it.

The cosmopolitan Siluridæ is composed of a large number of subfamilies, seven of which are American, or have representatives in America. They vary considerably from the most generalized Tachisurinæ which most resemble the Diplomystidæ to the Dorandinæ

and Ageneiosinæ, in which last we observe an approach to the conditions obtaining in the families with closed air bladders. The methods of transition from the Ageneiosinæ to the Hypophthalmidæ has been pointed out by us.*

As is intimated above, the Tachisurinæ are the lowest of the living Siluridæ. The members of this subfamily are mostly marine, and from it have, in all probability, been derived the remaining subfamilies. Some members of Tachisurinæ have only the maxillary barbels developed, while in others the mental barbels have been added.

From the Tachisurinæ have unquestionably been derived the Callophysinæ and Pimelodinæ, which differ from each other in dentition. Both these subfamilies are neotropical in their distribution, the Callophysinæ being found in the Amazon and northward, the Pimelodinæ in the whole region from the La Plata to Mexico. One of the chief features modified in passing from the Tachisurinæ to the Pimelodinæ is the space between the anterior and posterior nares. In the Pimelodinæ the barbels obtain their greatest specialization. The nasal barbels are, however, not developed before the Bagrinæ are reached. All the North American species belong to this subfamily.

From the Pimelodinæ have also been derived the Doradinæ, in which dermal ossifications first make their appearance. †

In the Doradinæ and the succeeding subfamilies of Siluridæ the Weberian apparatus varies greatly and the whole group seems to be in a state of unstable equilibrium.

In the Ageneiosinæ appears for the first time the great reduction and splitting into lateral halves of the air bladder. From the Ageneiosinæ were undoubtedly directly derived the Hypophthalmidæ.‡

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*American Naturalist, July, 1888.

†Minute plates are noticed along the anterior portion of the lateral line of *Platystomatichthys sturio* (Pimelodinæ).

‡The members of this family were widely separated from the Ageneiosinæ by Günther, Cope and others on account of the supposed absence of an air bladder and the simple anterior vertebræ. R. Ramsay Wright proved the presence of an air bladder and that the anterior vertebræ are coössified, and we have in our MS. Review of the Nematognathi followed older authors in placing the genus Hypophthalmus near Ageneiosus.

From the primitive Ageneiosinæ and Auchenipterinæ have evidently been derived, as a lateral offshoot, the Pygididæ, of which the Cetopsinæ retain the most ancestral traits. In this family nasal barbels again appear. Some members of Stegophelinæ have lost the habit of free swimming, and live as commensals in the gill cavity of large species of Siluridæ.

The three remaining families were, by Dr. Günther, united in one of his inferior groups, Hypostomatina. They have little external resemblance to the Siluridæ.

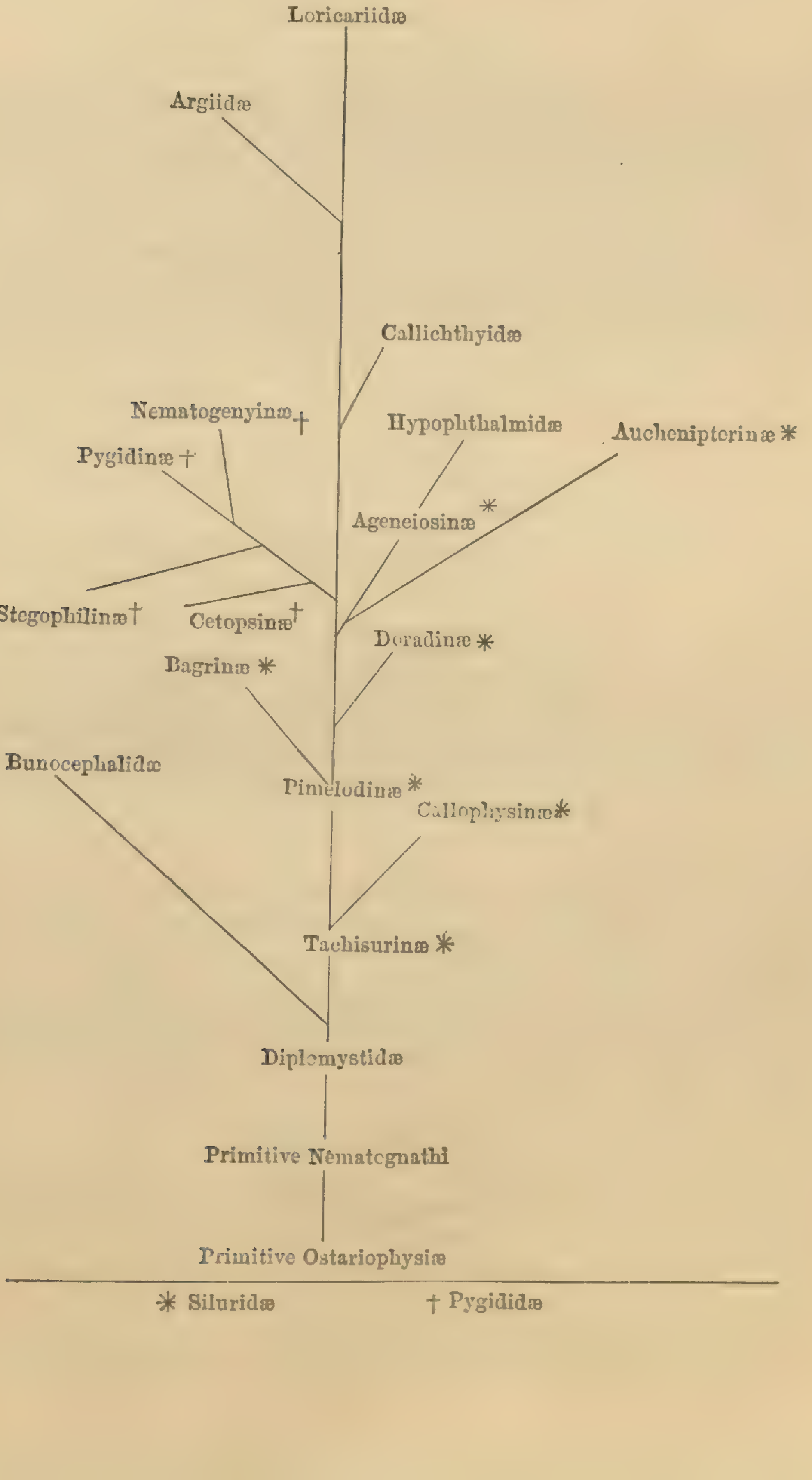
The Callichthyidæ have two series of smooth plates covering the sides, while the Loricariidæ have several series of rough plates. The teeth and dentiferous bones of the latter have also been considerably modified. The Argiidæ are dwarfed forms inhabiting high mountain streams.

As diagnoses of the families enumerated here were published by us*, and more detailed descriptions of both the families and subfamilies will appear in a subsequent paper already referred to, no further descriptions will be necessary here. We wish to raise the genus *Diplomystes* to family rank on account of its dentiferous maxillary. The transitions from one family to another are, in most cases, very gradual.

How far paleontology will bear out the system here proposed remains to be seen.

The following diagram represents the inter-relation of the families of Nematognathi and subfamilies of Siluridæ and Pygididæ:

*American Naturalist, July, 1888.


Loricariidæ
Argiidæ
Callichthyidæ
Nematogenyinæ †
Hypophthalmidæ
Auchenipterinæ *
Pygidinæ †
Ageneiosinæ *
Stegophilinæ †
Cetopsinæ †
Doradinæ *
Bagrinæ *
Bunocephalidæ
Pimelodinæ *
Callophysinæ *
Tachisurinæ *
Diplomystidæ
Primitive Nematognathi
Primitive Ostariophysiæ
* Siluridæ
† Pygididæ

DESCRIPTION OF A FOSSIL SPECIES OF SEBASTODES.

BY CARL H. EIGENMANN.

During half an hour's search in a bed of Tertiary fossils at Port Harford, Cal., a comparatively large number of fish remains were discovered. They consisted mostly of isolated, and in many cases fragmentary, bones, mixed with the remains of mammals, birds, crustaceans, radiates and mollusks.

Among the fish remains is the lower limb of the preopercle of a Sebastodes, or some related genus. It represents a fish about .30 m. long. The three lower preopercular spines are of about equal size, and the distance between them is about equal. They are all directed downward and backward. The ridge between the exposed portion of the limb and that portion serving for the attachment of the muscles of the cheek, is less marked than in living species, and the latter surface is shallower and broader.

Compared with living species of Sebastodes this species most resembles *rosaceus;* the preopercle is, however, much heavier.

The openings into the mucous canal differ from all living species very strikingly. There are three such openings, or pits, on the anterior half of the first spine, decreasing in size backward (the posterior is quite small and not in view in the accompanying figure). There is a large pit between the first and second, and another between the second and third spines, and two smaller ones on the anterior half of the second spine. The species may stand as *Sebastodes (?) rosæ.*

I have named this species for Rosa S. Eigenmann.

Other fossils from the same locality are 1, *Strongylocentrotus purpuratus* A. Ag.; 2 *Scutella gibbsii* Rémond; 3, *Cancer brewerii* Gabb; 4, *Cancer antennarius* Stimpson; 5, *Cancer magister* Dana.

As far as I am aware, Nos. 1, 4 and 5 of the above have not been found as fossils before.

Length, .02 m.

DODECATHEON MEADIA. (Shooting Star.)

BY KATHARINE BRANDEGEE.

Since the publication of the Botany of California and the Synoptical Flora, three papers dealing with Dodecatheon have appeared in American journals. The first by Mr. A. F. Foerste* is a most interesting contribution to our knowledge of its structure and growth; the second a tentative revision by Dr. Gray† suggesting rather doubtfully five species, one of them, *D. Hendersoni*, new; and the third by E. L. Greene§ in which three new species are proposed upon very trivial and inconstant characters.

It has been known ever since the cultivation of Dodecatheon in gardens, that it was most easily propagated from root-buds. Mr. Foerste in the paper alluded to above has shown by figures the formation of these buds, and makes the interesting observation that the leaf-arrangement is preserved in the roots. That these buds at the upper ends of the roots are developed in the axils of leaves is difficult of demonstration in the common variety with very short rootstock, but in the form known as var. *alpinum*, which belongs to high altitudes, and generally grows in bogs, the rootstock is often much elongated, and the transition from leaves with a bud above and a root below, to scales more and more reduced, but holding the same position, can be easily seen. These roots are thick and fleshy, abound in starch for some distance from their origin, and when separated from the parent plant by its decay, by the scratching of birds or the rooting of hogs, are quite capable of giving their buds a fair start in life. In some forms the roots of a variable number of the numerous buds produced around the rootstock cease growing at a short distance from the stem, and have nearly the appearance of small wheat grains, and their connection with the parent not being strengthened by the passing of nutriment is much slighter. This character, though so obviously inconstant and dependent like the number of the leaves, largely upon the character of the soil or the degree of moisture, has been relied upon as the principal one to distinguish two species, *D. patulum* and *D. Clevelandi* Greene.

These rootbuds, whatever their form or the extent to which the attached root is produced, are equally capable of independent growth, and at least in Central California most of the new plants

*Torr. Bull. XI, 31. †Bot. Gaz. XI, 23. §Pitt. I, 209.

originate from them, and can always be distinguished from seedlings by the primary leaf which, although resembling the cotyledons, is solitary.

The petals of Dodecatheon, and sometimes the sepals and stamens may be more or less than the normal number, five, and one of these variations is the basis of the recent species, *D. cruciferum* Greene. They are usually, but not "invariably," four in that, the common form about San Francisco otherwise absolutely identical in all its parts with the one found in the foothills of the Sierra Nevada, which has usually, but not invariably, a 5-parted calyx and corolla.

D. Meadia var. *alpinum* and *D. Jeffreyi* are also in most cases 4-merous. *D. Meadia* var. *brevifolium*, of the Botany of California, has 4–9, very commonly 6 petals, though the sepals and stamens are very rarely more than five.

There has been some dispute as to whether the filaments of Dodecatheon are truly connate in a ring, and Dr. Gray in his latest revision re-establishes *D. frigidum* principally on the ground that the very short filaments are unconnected, although Chamisso & Schlechtendal* in the original description say they are connate, and it may be easily demonstrated in this case as in the forms known as *D. Jeffreyi* and var. *alpinum* which usually have sessile anthers, that the filaments are truly united into a tube which is adnate to, though easily separable from, the whole length of the corolla tube, and that in this regard the varieties, and even the individuals, differ simply in the length of the filaments.

No constant character can be found in the more or less thickened dorsal folds of the filament and connective, which apparently serve to secure the introrse opening of the anthers and include till after fertilization, the afterward elongating stigma. The color of the anthers, and even their relative length and slenderness, are not more to be relied upon, for any large suite of specimens will readily show that in these particulars the individuals of each of the forms, especially of that known as *D. ellipticum*, differ widely amongst themselves.

The characters drawn from the capsule are in the light of recent observations almost equally unreliable. Dr. Gray having had his

*Linnæa, I, 223.

attention called to the operculate dehiscence of one of the western forms, founded upon the apparently good character a new species which he called *D. Hendersoni* in recognition of the observant botanist who made the fact known to him. Mr. E. L. Greene has since shown, however, that this peculiarity belongs to nearly all the forms found on this coast. He was mistaken in supposing that even *D. Jeffreyi* or its depauperate alpine form, var. *alpinum*, has a strictly valvular dehiscence, for the capsule does not split through the base of the style, that organ, as a preliminary step, falling off with a small portion of the attached apex. The dehiscence is, therefore, intermediate between *D. Meadia* of the east, and its varieties *ellipticum* and *Hendersoni* of this coast.

The length of the capsules is often extremely unequal, even in individuals growing together, and this inequality is especially noticeable in var. *Hendersoni*, and renders comparison with the calyx o little diagnostic value. Dr. Gray remarks* that "the truncate orifice seems indisposed to split up at all into valves." In this instance he must have been misled by immature specimens, for in those fully ripe the margin, as in all western forms, splits for a short distance into a variable number, 5–12, teeth. The so-called operculum, and therefore also the truncate margin of the capsule is usually somewhat irregular in shape.

The stipe of the columnar placenta is as variable as the other parts of the plant. In var. *Jeffreyi*, which appears to have stronger claims to specific rank than any other form, it is very short, while a fruiting scape from Alaska in which the dehiscence is apparently valvular, has a stipe as long as the placenta.

The seeds differ but little at the same stage of growth in any of the western varieties, as far as color and reticulation go, but in both forms of var. *Jeffreyi* they are somewhat oblong in shape, their margins produced into short wings, and the hilum instead of an umbilical depression, takes the form of a linear ridge. It is possible that *D. frigidum* and *D. dentatum* may agree with var. *Jeffreyi* in these particulars, and thus strengthen its claim to specific rank under the oldest name, but fruit of these northern forms seems to be very little collected, and even of typical *D. Meadia* of the east no mature specimens have reached the writer. Yet it is so easy to cultivate

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* Bot. Gaz. XI, 233.

these plants and their rootbuds, if not their seeds, are so easily obtainable that the question should soon be settled.

Until such time the following arrangement of the forms is offered as agreeing somewhat better than the older ones with more recent and more extended observations.

D. MEADIA L. Leaves tapering at base; stamen-tube exserted; dehiscence valvular.—Eastern United States extending to the Rocky Mountains and Northern Mexico.

———var. JEFFREYI. Leaves linear-oblanceolate tapering into the petiole; flowers usually 4-merous; stamen-tube little or not at all exserted; style and a small portion of the apex of the capsule falling off in dehiscence; seeds with narrow wing-like margins and prominent linear hilum. *D. Jeffreyi* Moore (according to Dr. Gray); *D. Meadia* vars. *macrocarpum (?)*, *lancifolium* and *alpinum* Gray.—Sierra Nevada from 4,000–8,000 feet, usually in bogs. Some specimens collected on the floor of the Yosemite are two or more feet in height with leaves eighteen inches long, but at greater elevations it is represented by the very much smaller var. *alpinum*.

———var. FRIGIDUM. Leaves broader, usually thin; stamen-tube not exserted; mature fruit unknown. *D. frigidum* Ch. & Schl.; *D. dentatum* Hook.; *D. Meadia* var. *latilobum* Gray.—Oregon to Idaho, Alaska and Northeastern Asia.

———var. ELLIPTICUM. Leaves thickish obovate, oblong or oblanceolate with cuneate base; stamen-tube exserted; scapes low and stout; petals 4–9, yellowish, pure white or rose-colored; anthers usually rather short and blunt; capsule commonly short and blunt, with circumscissile dehiscence. *D. ellipticum* Nutt.; *D. Meadia* var. *brevifolium* Gray; *D. patulum* Greene.—San Diego to the Columbia River, often in the Sacramento Valley growing in the margins of small depressions, "hog wallows," which are filled with water during the rainy season.

———var. HENDERSONI. Leaves as short but usually broader than the last; scapes taller, the corolla usually rose-colored and often 4-merous, the petals sometimes laciniate; stamen-tube exserted, the anthers usually longer and more pointed than in the last; capsule circumscissile and commonly longer and less blunt. *D. Hendersoni* Gray; *D. cruciferum* & *D. Clevelandi* Greene.—Throughout the length and breadth of California.

ORNITHOLOGICAL OBSERVATIONS DURING THE TOTAL SOLAR ECLIPSE OF JANUARY, 1889.

BY WALTER E. BRYANT.

In the afternoon of January 1, 1889, occurred phenomena of such great importance to astronomers that they took every precaution to secure valuable observations and data from various localities. Most of these results have already been published, but as yet I have heard nothing from ornithologists who apparently failed to improve the opportunity for observing the effect upon birds of the sudden obscuring of the sun.

Some years ago a partial eclipse of the sun occurred soon after rising, and although I went some miles on foot to a favorable locality near Oakland, Cal., and noted the activity, songs, etc., of the birds for two hours, I was unable to connect any of these events with the eclipse, which was so slight, that I doubt if the birds were at all conscious of anything unusual.

Had I anticipated anything so wonderful as the total eclipse proved to be, I should have endeavored to stimulate observers to take the field and have suggested a schedule upon which to record correlative phenomena during the afternoon. With such material a generalization might have been made developing new facts. As it is I can but give the notes which I made at Healdsburg, Sonoma county, at which place the eclipse was total for about fifty seconds, and I believe the line of totality extended for some eight miles beyond.

My observations were made while photographing phases of the eclipse in a vineyard about one hundred yards from large, leafless white oaks, and two hundred yards from a grove of madroño. The location was quite favorable, being upon high ground between Russian River and Dry Creek, and fairly swarming with birds, principally robins, whose medley of calls and songs rivaled the confusion in a bird-store.

Not having any one to call time for me the seconds were not taken, nor are they important in this connection. Observations were recorded every five minutes after 1:20, some time before any noticeable effects upon the birds were seen, and half an hour before totality; also, for half an hour following totality, which occurred at Healdsburg about 1:50.

The first contact was at 12 h. 25 m. 23 s., about one hour previous to my note-taking. Weather, sunny, calm and fairly clear.

1:20—Robins *(Merula migratoria propinqua)* were scattered about the vineyard feeding upon dry grapes left upon the vines, or collected in the leafless oak trees, singing loudly in confusion with a flock of blackbirds *(Scolecophagus cyanocephalus* and *Agelaius gubernator).*

1:25—No difference in the behavior of the above mentioned birds, whose abundance and noisyness were closely watched throughout. A few Audubon's warblers *(Dendroica auduboni)* were seen feeding in the vineyard.

1:30—There was a momentary lull in the medley of bird notes due, I believe, to a change in position of some of the robins and blackbirds, for the songs at once recommenced after they had alighted.

1:35—Most of the robins had ceased singing, but continued their startled calls ; the notes of the blackbirds became quieter.

1:40—The robins became very restless, frequently calling, but not one singing ; the blackbirds, too, were uneasy, and almost wholly silent. It was now getting very dark, and stars were visible. A few ground squirrels *(Spermophilus grammurus douglassi)* were out from their holes, and one that had his cheek-pouches crowded full of corn, stood bewildered near his hole until I came within ten feet of him. This species is usually very shy, so much so that it is often difficult to shoot them over open ground, yet here was an individual that did not seem to realize that I was so close, for his entire demeanor was fearless.

1:45—The blackbirds took wing and circled in a close flock about the trees ; but few sounds were uttered by the robins.

1:50—At this time I recorded the sudden disappearance of all sun rays. The actual time may have differed two minutes, more or less. The sudden totality was accompanied by an awful stillness. The trees were full of birds, but not a sound was heard except a faint chirp from a goldfinch *(Spinus)* flying overhead, and suggestive of a bird migrating at night. The sky had a peculiar greenish color, and well may have caused terror among the birds.

During this period I was told by some neighbors that their chickens had gone to roost. Those which I observed appeared to be too suddenly overcome by the change, and did not go to roost, but huddled together close to the sides of buildings and fences.

A cow in a pasture near by came to the gate and lowed, as was her habit at milking-time, four hours later.

1:55—The first sunbeams were welcomed by the chirps of Audubon's warbler, then the notes, but not songs, of robins, and a sudden disturbance in the tree-tops as the apparently alarmed birds broke out in slight notes of their calls.

2:00—The metallic notes of the ruby-crowned wren *(Regulus calendula)* were heard, and increased noise from the robins.

2:05—A flock of eight mourning doves *(Zenaidura macroura)* flew past. The birds acted very much as on dark, cloudy days, but did not seem to be feeding. The cow returned to pasture.

2:10—Blackbirds were observed feeding.

2:15—The sun was about half obscured; nothing unusual could be detected in the behavior of the birds unless that they did not recommence their songs.

2:20—Vigorous crowing of roosters and increased screaming of robins.

2:25—A light breeze sprang up, and a normal condition of life among the birds was noticed, all again feeding and calling, but the songs had ended for the day with the exception of a few robins which sang in the oaks.

Summing up the general behavior of the birds during the event, the peculiarities which cannot well be defined in writing, were all, it seemed, due to a sense of terror from circumstances which were appalling inasmuch as they were unknown and unexpected.

In the Sacramento valley, I am told, the wild geese which were in flocks of hundreds were very noisy previous to the eclipse, but when darkness came on they became quieter, and many took wing, probably to the night resting grounds.

Since this paper was written I have received a letter from Mr. Chas. A. Keeler of Berkeley who was at San Rafael, Marin county, on the day of the eclipse. At that place it was not total, but his observations seem to coincide with mine, that the actions of the birds were caused by fright. He writes: "Until the eclipse neared totality the birds acted in a perfectly normal manner. When nearly total all bird notes were hushed. The sharp metallic note of the California brown towhee *(Pipilo fuscus crissalis)* was no longer heard, and the same was the case with the Arkansas goldfinch *(Spinus psaltria)* which was also common. A number of Anna's

humming-birds *(Trochilus anna)*, however, acted quite differently. When the eclipse was fullest they flew about near some gum trees uttering a sharp, loud note of alarm somewhat different from anything I ever heard from them. When the sky grew brighter their manner again became normal."

HABITS IN THE LIFE HISTORY OF *PLEOCOMA BEHRENSII.*

BY J. J. RIVERS.

This is one of the larger species of California Scarabæidæ, belonging to the sub-family *Laparosticti* of the classification of N. A. Coleoptera. The natural history of the members of this genus of beetles was until recently entirely conjectural. Four species were identified by various authors up to 1870, but Dr. J. L. LeConte established the genus, and Dr. Horn in 1888 published in the Transactions of the American Entomological Society, a systematic review of the species, which then had increased to seven, Dr. Horn having added three new ones. Since this work appeared another has been discovered, and the female of *P. conjungens* has also become known. Of the eight species seven are Californian, one of which, however, extends its area into Oregon, as I learn from a label attached to an example of *P. Ricksecker*i in the collection of Mr. Charles Fuchs. The other species is Arizonian.

The larva of *P. Behrensii* is found in its own burrows in the earth, which is usually of a rich, loamy or clayey nature, intermixed with humus, through which pass decaying rootlets of shrubs and trees. The decaying fibres, together with fungoids, appear to be the only possible vegetable food within the reach of this insect in its growing state. The perfect beetle is found during the first heavy rain storm of the season, which often comes in the month of October, and as soon as the ground has become sufficiently softened by the rain the beetle emerges from its subterranean home. The female has but very rudimentary wings, measuring only a fourth of an inch, a size which renders impotent any attempt to raise its own body, which measures one and three-quarters inches. She therefore being apterous, simply comes to the surface and re-enters the earth in a fresh place. The male, however, takes wing and goes in search of the

other sex. He is a good flyer, and possesses the secret of finding the retreat of the female, though she be hidden beneath the earth beyond the penetration of eyesight.

Last season while in search of specimens of this species, I saw a male example coming towards me, and when about a yard off he altered the direction of his course by swerving and then circling around me, and finally dropping to the ground, where he immediately commenced burrowing, and in a very short time, perhaps about a minute, was buried out of sight. I at once suspected that he had traced out the abode of a female. I began excavating the ground where the beetle entered, and in a short time exhumed both male and female, they having become companions at a depth of six inches; proving conclusively that the male is endowed with the power of finding the female, though she be hidden from view. The female most probably had not long entered the earth, or it may be the habit to remain near the surface in order to be more surely found by the male. However this may be, the depth at which pupation takes place is two feet or more, and it takes place in an earthern cell compactly constructed and cemented together, so as to retain its shape after removal.

The observations upon the movements of the male make it evident that he searches for the other sex by scent; and a correlative fact is, that at the time he circled around me, he had been drawn on the line of scent of a female which was in a box in my coat pocket; for when I first saw him he was hovering about the place from which I had just before removed the female, and when he left that place his course was straight towards where I stood, making a turn around me, but coming in contact with a stronger wave of scent from another female, it led him into the ground as related above.

This is not a new principle of attraction between the sexes, for on the contrary it is the oldest known in the animal economy. The higher classes of animals possess it largely, and is a commonly observed power among the Articulata, but it is among the members of the group Bombycidæ among the Lepidoptera that this method of attraction has been mostly observed, and particularly among those species in which the wings are fully developed in both sexes, as well as among the other groups wherein the wing power of the male is ample, and the female completely apterous. But this case

of Pleocoma is one of the strongest examples among Coleoptera, and is new in this: That while all those others are examples of following a scent carried upon waves of the atmosphere, there is here added the faculty of tracing it to a point well beneath the earth.

A CARDON FOREST.

BY T. S. BRANDEGEE.

Cereus Pringlei was described from specimens collected by Mr. Pringle in northwestern Sonora. Later it was collected by Dr. Palmer on San Pedro Martir, an island of the Gulf of California, and since then has been found to be one of the most abundant of the many species of cactus growing in Lower California. There are few places between the southern end of the Peninsula and San Quintin, where this huge cactus can not be seen. It is called by the Mexicans "Cardon;" they, however, apply the same name to another giant cactus (*Cereus pecten-aboriginum*), equally as tall and growing with *C. Pringlei* in the southern part of the Peninsula. Along the road between La Paz and Triunfo grows one of the largest and most striking cardon forests I have seen in Lower California. The forest is composed mainly of plants of *C. Pringlei* that cover the ground almost entirely for miles, so that when looking down upon it not even a bush is visible. The plants are three or four feet or more in diameter, branch near the base, and send up a half-dozen of nearly erect stems to a height of twenty to forty feet. It is a strange and interesting sight, and in April when the numerous large cream-white flowers are in bloom must be very handsome.

Cereus pecten-aboriginum is not abundant, excepting, perhaps, in the Sierra de Laguna; it is more graceful than *C. Pringlei*, has sharper ribs and a purple tinge to the whole plant, but is most readily distinguished by its fruit, which seems often to persist for a year. This giant cactus was named by Dr. Engelmann from specimens of the fruit bought by Dr. Palmer from the Papago Indians of Sonora, who used it as a hair comb, a use that suggested the specific name. The fruit covered with stiff yellow spines forms balls six inches in diameter, and often many of them growing close together, crowd the tops of the branches. Small plants of this cactus grow upon the islands about the harbor of Mazatlan.

CROSSOSOMA.

BY FRANK H. VASLIT.

This genus, which has been referred to various orders with more or less uncertainty, consists of two described species. *C. Californicum* was described from Catalina Island, and has since been found on Guadalupe Island. It was said to be four feet high, but has since been observed on the island where it was first discovered to be as much as twelve feet high and four inches in diameter.

A collection made by Mr. Brandegee last year in Lower California makes it doubtful whether the second species, *C. Bigelovii*, is anything more than a depauperate variety of the first. In these specimens of Mr. Brandegee's the petals, though more slender than those of the island form, are 8–16 mm. long, the stamens 15–30, and the carpels nearly as long as in the original species. The leaves as in all the mainland forms are smaller, thicker, and with less distinct reticulations.

Certain structural peculiarities seem to have been in some degree misunderstood. In the original description Nuttall states that the carpels are united at the base and stipitate. Although this character does not appear in his plate, and has been neglected by every subsequent author, it is true to an extent which Mr. Nuttall probably never observed, the stipe being in many cases 8–10 mm. long. The carpels are often six. Bentham says that the carpels separate into two valves, a statement which is certainly not borne out by the facts. They open only along the ventral side, and never by the dorsal ridge, which represents the midrib ot the leaf. The seeds are minutely reticulate, the base of the aril is apparently continued as a lining to the inflexed hilum.

RECENT LITERATURE.

ZOOLOGY.

In the initial article of the January number of the *Auk*, Mr. J. A. Allen makes many timely remarks and intimations on "To What Extent is it Profitable to Recognize Geographical Forms among North American Birds." Not only will it bear careful reading and consideration by nearly all the ornithologists of this country, but mammalogists and others may well reflect upon the importance of allowing "incipient local forms" to "escape till further differen-

tation, in future ages, shall render them desirable captures." The author has always been regarded, on the Pacific Coast at least, as one of the most conservative American zoologists, but whether being "conscious of my own changed tendencies" may be interpreted as an endorsement of the present "hair-splitting" in American ornithology will remain to be seen. We think not, and shall await with keen anticipation his forthcoming revision of the susceptible genus *Tamias*.

The benefit to ornithology resulting from the study and application of the ideas presented by Mr. Allen is not to be estimated now. A few years hence may show whether any consideration is given to the question in the light in which it is presented, or whether like the "Plea for the Metric System" published a few years ago by Dr Merriam, it is passed without regard.

It has been a matter of some surprise that American zoologists have not been able to agree upon a standard unit of measurement as well as a uniform method of measuring, based upon the most important structural members and the most tangible points for ascertaining the dimensions. In the length of the tail of a bird some four or five different starting points are used by as many different individuals, rendering the figures of one almost valueless for comparison with the others.

W. E. B.

Judging from the comments which occasionally appear in the Ornithologist and Oölogist—and there must be many that do not appear—some of its patrons are slightly dissatisfied with the quality of some of the articles, and do not hesitate to let the publisher have the advantage of their views. His genial and independent nature once classified some suggestions alphabetically and continued in the usual style.

The February issue contains a number of interesting papers, and also several installments of the catalogue of the "J. P. N." collection of eggs, wherein the collector seldom receives mention.

W. E. B.

Wissenschaftliche Resultate der von N. M. Przewalski nach Central-Asien unternommenen Reisen. Zoologischer Theil—Bd. III, Abth. 2. By S. HERZENSTEIN, St. Petersburg, 1888. Part 1. Being descriptions of the species of Nemachilus, including six new species. With plates I–VIII. 1889.—Part 2. Descriptive of the

new genus Lefna, including one new species and of the species of Schizothorax, including seven species new to science. With plates IX–XIII.

Cave Animals from Southwestern Missouri. With two plates. By S. GARMAN. Bull. Mus. Comp. Zoöl. XVII. No. 6. Dec. 1889. Mr. Garman discusses a collection made by Miss Ruth Hoppin of Jasper county, Missouri, who made notes on the living forms. Only one species of fish, *Typhlichthys subterraneus*, is mentioned. It was represented by a large number of specimens, mostly from wells, a few from caves and one from a creek outside. Two new species of Crustacea are described by Prof. W. Faxon into whose hands the crustacea were placed for identification. The invertebrates which were sent to Prof. H. Garmam to study contained no new forms. R. S. E.

Descriptions of New Species of Fishes collected at the Galapagos Islands and along the Coast of the United States of Columbia, 1877–'88. By DAVID STARR JORDAN and CHARLES HARVEY BOLLMAN. From Proc. U. S. Nat. Mus. XII, pp. 149–183. Washington, 1889. Thirty-one new species are described, being part of a collection made by the U. S. Fish Comm. steamer Albatross. A genus related to Lepidogobius is named Bollmannia, by Dr. Jordan, in honor of the junior author of the paper, who died while engaged in exploring the rivers of Georgia, while it was passing through the press. Three other new genera are described. R. S. E.

List of Fishes collected by Alphonse Farrer about Mazatlan, with Descriptions of Two New Species—Heros beani and Pœcilia butleri. By D. S. JORDAN. Proc. U. S. Nat. Mus., 1888, pp. 329–334.

List of Fishes now in the U. S. National Museum, Collected in Nicaragua by Dr. Louis F. H. Birt. Ibid., l. c., p. 411.

On the Occurrence of the Great Lake Trout (Salvelinus namaycush) in the Waters of British Columbia. Ibid., l. c., p. 58.

Notes on a Collection of Fishes Obtained in the Gila River, at Fort Thomas, Arizona, by Lieut. W. L. Carpenter, U. S. A. By PHILIP H. KIRSCH.

The generic name Xyrauchen is proposed for *Catostomus cypho* of Lockington, a species from the Gila river. One new species (*Catostomus gila*) is described. R S. E.

A Review of the American Species of Sturgeons (Acipenseridæ.) By P. H. KIRSCH and MORTON W. FORDICE, Proc. Acad. Nat. Sci., Phila., 1889, pp. 245–257.

Description of a New Species of Bathymaster (B. jordani) From Puget Sound and Alaska. By CHARLES H. GILBERT. Dated August 27, 1889. Proc. U. S. Nat. Mus., 1888, p. 554.

Notes from the San Diego Biological Laboratory. Part I, The Fishes of Cortez Banks, issued November 9, 1889. *Part II, Additions to the Fauna of Cortez Banks; additions to the Fauna of San Diego; Fishes of Ætna Springs, Napa County, Cal.; Fishes of Allen Springs, Lake County. Cal.; The Young Stages of Some Selachians*, issued December 19, 1889, by C. H. and R. S. EIGENMANN. Reprinted from West Am. Scientist.

Notes from the San Diego Biological Laboratory, III. Additions to the Fauna of San Diego. Issued March 24, 1890. Ibid. Extract Proc. Cal. Acad. Sci., Ser. 2, Vol III, pp. 1–24.

In these papers are included fifty species which are new to the vicinity of San Diego, being about 33 per cent. of the entire fauna. Of this number nineteen are here described as new.

BOTANY.

Manual of the Botany of the Northern United States. Sixth ed., revised and extended westward to the 100th meridian. By SERENO WATSON and JOHN M. COULTER. The present edition of Dr. Gray's familiar manual includes, besides the phanerogams, all the vascular cryptograms with the exception of the mosses, which would make the volume inconveniently large. Very few names are changed, a matter of congratulation in the present unsettled state of botanical nomenclature. It will be quite time enough to make these changes in text-books and manuals when some deree of permanency shall have been reached.

T. S. B.

In a paper by Dr. F. Niedenzu in Engler's Jarhrbuch, 1889, entitled "Über den Anatomischen Bau der Laublätter der Arbutoideæ und Vaccinioideæ," *Arctostaphylos alpina* is raised to generic rank under the name *Arctous alpina* (L. Gray)—*Arctous* being the sectional name applied to it by Dr. Gray. Drude, in the Ericaceæ of Natural. Pflanzenf. adopts his view and writes the name *A. alpina* Niedz. Dr. Parry, in Bull. Cal. Acad. ii. 489 (1887), referred this plant "to an older genus *Mairania*, Neck., viz.: *M. alpina* Desv."

T. S. B.

Sylloge Fungorum, vol. viii., Dec. 1889, By P. A. SACCARDO. This volume completes the great work undertaken by the author seven years ago, though a second volume of "Additamenta" is promised. The amount of labor involved in bringing together, in connected form, diagnoses of all known species of fungi, amounting to 31,927, is sufficiently great to exclude any idea of critical work. The great benefit conferred on mycologists consists in bringing to their notice in accessible form all the species, and thereby greatly simplifying the revisions which are now in order, and which will greatly reduce their number. H. W. H.

PROCEEDINGS OF SOCIETIES.

CALIFORNIA ACADEMY OF SCIENCES. *March 3, 1890.* President Harkness in the chair.

A paper by W. J. Raymond, edited by Dr. J. G. Cooper, was read by title, and referred to the Publication Committee.

Mr. Gutzkow exhibited a specimen of Cordyceps growing from the larva of a moth. Dr. Behr and Dr. Harkness commented upon its life history.

Mr. T. H. Hittell read the following notice, which, on motion, was spread upon the minutes:

Ernest Cosson, honorary member of this society, died at the age of 70 years, on the last day of 1889, at his residence in Paris. A man of generous disposition, and in easy circumstances, he early turned his attention to botany. Well known in France as the author of excellent local botanical works, he is best known abroad by his connection with the exploration of Algiers, to the botany of which he devoted the last forty years of his life, and which, delayed by his conscientious care, remains unfortunately unfinished. He was elected a member of this society in 1887, and testified his interest in our welfare by sending us publications and a large collection of Algerian plants, and when overtaken by his last illness was preparing to send us a second installment. His death is a severe loss to science, as well as to all his friends.

March 17, 1890. President Harkness in the Chair.

Dr. Harkness read a short paper on the "Nomenclature of Organic Life."

Some specimens of a tuberiform growth were presented by Mr. August Ehrlich, of Kaweah, Tulare County. They were found in the earth, in making a mountain road, and were at first soft, but hardened in drying. Dr. Behr and Dr. Harkness discussed their origin; the latter considered them sclerotia, belonging to some fungus, perhaps *Polyporus tuberosus*.

Dr. Harkness exhibited specimens of *Rhytisma Arbuti*, a fungus found on the under side of the leaves of the Madroño (*Arbutus Menziesi*), on Mt. Tamalpais, and killing so many of the leaves that in many places the slopes have a rusty brown appearance.

SAN FRANCISCO MICROSCOPICAL SOCIETY. *March 13, 1890.* President Wickson in the chair.

The usual periodicals and exchanges were reported and placed on file.

The special discourse of the evening was then delivered by Professor Joseph Le Conte, of the University of California, his topic being "The Germ Theory of Disease." All decay he said was accompanied by and caused by micro-organisms, and its rapidity depended upon and corresponded with the rapidity of the development of those organisms.

The importance of this fact to industries was noted, as also the necessity of these organisms to the process of decay without which life itself would soon be impossible.

The remarkable analogy existing between the phenomena of contagion and those of life was alluded to, but the speaker remarked that science is content only with absolute proof and that it had become necessary to modify in many important particulars the original sweeping claims of the advocates of the germ theory, many grave disorders now being attributed to secondary effects known as ptomaines.

In conclusion the distinguished speaker drew a vivid picture of the heights which science would undoubtedly yet attain in the extension and practical application of the great truths of the germ theory. He was unanimously accorded a vote of thanks for his very interesting lecture.

After the reading of the paper by Professor Le Conte, the President invited discussion and remarks, which was generally entered into by members, and resulted in eliciting further interesting facts and opinions.

Dr. J. H. Stallard exhibited, as pertinent to the subject of the evening, a pure culture of *Bacillus lepræ*, started in 1886, and a nearly pure culture of *Bacillus tuberculosis*,

March 26, 1890. Vice-President Bates in the chair.

The Secretary reported the usual additions to the library of periodicals and proceedings.

R. H. Freund and John D. Coulie were elected active members and the application of Dr. E. S. Clark was received.

The paper of the evening was by Carl H. Eigenmann, Ph.D., on "The Genesis of Chromatophores in Fishes." Mr. Eigenmann has made a special study of the life of fishes and his paper bore the stamp of original investigation.

By way of introduction he mentioned how the color of fishes varied under different conditions; the color of the food would modify it, or the color of the bottom of the sea where the individual made its habitat would change it. The same species, under these varying conditions, would show a marked difference of color in tide pools separated but a few feet.

In order to fully explain the formation of the chromatophores or color cells, the speaker gave a brief outline of the development of the fish, its embryology. A number of carefully made drawings supplemented various preparations shown under the microscope, and the various stages of the embryo were drawn on the blackboard.

Pigment is nearly always found sometime before hatching, and as the embryonic life of pelagic eggs is usually short, lasting from eighteen to forty-eight hours, and the eggs are transparent, the whole process, from fertilization to hatching, can be observed without any very great inconvenience. The observations recorded were all made on the living egg, which was usually placed under a cover-glass, supported either by wax feet or paraffine rings.

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